The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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Modern Inorganic Chemistry

AS men drive their mines ever deeper into the earth to obtain the minerals they need, as they increase year by year the pressures at which they carry out chemical reactions, as they obtain power by newer methods involving higher boiler pressures, as they devise new and more intricate machinery and manufacture their goods by more delicate processes, so they find it necessary for those who control industry to widen and deepen their knowledge of science. In other industrialised countries, Germany and the U.S.A., for example, there has long been close co-operation between industry and the universities. "Learn," said Cato of old, "but learn from the learned." In this country we have not achieved the close collaboration that is so desirable. The reason, according to Dr. H. W. Keenan, has been largely financial. We believe it rather to have been the inability to persuade financial men that that way lie dividends. There is plenty of money available in this country for the support of any good cause, and even for wild-cat "money-making" schemes, when those in control of the money bags can be persuaded—or as sometimes happens, compelled—to part. The universities cannot support industry unless industry supports the universities. There should be constant interchange of scientific and technical men between industry and the universities in order that each may understand the problems of the other, and the flow of knowledge maintained.

A step in this direction has been made by the Oil and Colour Chemists' Association who, acting on the principle of learning from the learned, arranged for the delivery of two lectures by Dr. Emeléus at Imperial College on the general subject of modern advances and technique in inorganic chemistry. It is safe to say that no one could have listened to the fluent description of the advances of knowledge within the past 10 or 20 years given by Dr. Emeléus without profit to himself and a widening of his horizon. The horizon of the industrial chemist is often bounded by his own immediate work, and a comprehensive survey of what is being done in related fields of pure science cannot fail to stimulate thought and broaden ideas. The difference between the conceptions of inorganic chemistry to-day and those of the times when many of our readers passed through their universities is striking.

Inorganic chemistry owes a vast debt to Bragg; its modern developments appear to be based upon his foundations of crystallographic structure. The use of X-rays has progressively deepened our insight into the constitution of matter so that whereas the older generation was taught that matter was divided into atoms, "exceedingly minute indivisible particles," and that these could exist in combination as molecules which we could never hope to see, to-day we have found means of examining the complex structure of the atoms themselves, and through the electron microscope we are within measurable distance of seeing the larger molecules. Moreover, the arrangement of molecules and atoms in matter has now been ascertained, so that the emphasis is not now placed upon the combinations of molecules with each other, but upon the manner in which they are linked together to form solid bodies. The sizes of the atoms are now discovered and, being known, have become an aid to the deduction of the arrangement of the atoms within the molecule. The study of molecular structure, particularly that of solids, has been one of the two outstanding developments in the inorganic chemistry of the past two decades.

The second important development has been the introduction of new techniques. This phase commenced with the work of Moseley in 1913 which enabled it to be ascertained that there were (at least) 92 elements, of which 6 were then missing. Three of these have since been discovered. Radioactivity has given us new methods of ascertaining the mechanism of chemical and physical reactions, and has put a new meaning to the term "sensitivity." The limit of sensitivity of ordinary chemical methods was 10^{-3} or 10^{-6}, whereas radioactivity detected by the electroscope enables us to work to a sensitivity of 10^{-14}. Striking examples of the use of radioactivity in research were given by the lecturer, some based upon naturally radioactive substances, others upon the recently established fact that radioactivity can be induced in every element. Deuterium has provided a useful tool in the study of exchange reactions, one example being that the normal compound NH_3HCl, has been traced through the series NH_3DCl, NH_2D_2Cl, NHD_3Cl, and ND_4Cl. Thermal diffusion, the movement of lighter molecules to a heated plate and of heavier molecules to a cooled plate, has permitted isotopes to be separated. This in turn has led to the discovery of isotopes of carbon through which the way is opened to a marvellous vista of research on physiological problems, the distribution of carbon in the body being followed by the distribution of isotopes. It is impossible here to do more than hint at one or two of the new developments in inorganic chemistry disclosed by Dr. Emeléus. In itself this venture of the Oil and Colour Chemists' Association should do much to help forward the movement for closer collaboration between the academic and industrial sides of national life.

NOTES AND COMMENTS

China Clay and Fullers' Earth Research

GREAT BRITAIN has, in Cornwall and Devon, the world's largest resources of china clay, and normally does a large export trade to most parts of the world, the quantity exported in 1937 being 830,946 tons. The principal producers of china clay, as Mr. Sydney Johnstone noted in his lecture to the Oil and Colour Chemists' Association (referred to elsewhere in this issue), have recently carried out a considerable amount of research on the preparation of special products to meet the needs of various industries. For instance, "Supreme" kaolin has a very smooth texture and it is guaranteed that 70 per cent. of the particles are not above 1 micron in size; another grade known as "Speswhite" has 50 per cent. of its particles not greater than 1 micron. A mixture of "Speswhite" and white Indian talc is sold for use as a suspender or thixotropic agent under the name of "Talcolin No. 1," to replace imported asbestine. Where a material of low oil absorption is required there is available a specially prepared product known as "Talcolite." Recently, Cornish china-stone, finely ground, has been marketed as a substitute for barytes, under the name of "Kalytes." Recent research has shown that by suitable treatment fullers' earth can yield valuable materials for the paint industry. One product known as "Fullogel No. 1" is a gel of the aluminium hydroxide type which, when mixed with water by strong mechanical action, forms a thixotropic gel. It can be used as a substitute for American bentonite for several purposes, notably in bituminous emulsions. It is claimed that natural fullers' earth, of which there are extensive deposits in this country, and others known but not yet worked, is superior to German green earth as a base for the manufacture of lake colours.

The Doctor in Industry

ANY measure able to give greater efficiency to industry deserves urgent and constructive consideration. Mr. Robert R. Hyde, director of the Industrial Welfare Society, in an article appearing in the *Manchester Guardian*, is able to show that the Industrial Medical Service is proving to be just such a measure, since it is bringing a very real benefit to industry. In his encouraging words he points out how doctors have reduced the absence of workers owing to sickness from an average of 10 to 3 days per annum, how septic cases caused by neglecting a slight wound have been almost obliterated, and how "specific hazards to which the worker is exposed by processes, faulty working conditions, or substances, have been minimised or abolished." So far so good. Mr. Hyde then has to make an unpleasant avowal. Namely, that in 137,294 factories where under 250 people are employed in each, representing 52 per cent. of the workpeople of the country, there is no such Industrial Medical Service. But sickness occurs and accidents happen, resulting in the same dislocation of production that the mammoth works have taken action to avoid. Dealing with the causes which are hindering the wide extension of a medical service in industry, Mr. Hyde refers to the fact that there is an absence of instruction on the subject in the medical schools, though post-graduate courses may be formed in the future to bridge the gap. He also lays stress on the fact that experienced and skilled doctors are needed for medical work in industry since the causes of ill-health are often caused by many harmful factors not at once apparent. Thus the affects of substances such as silica, asbestos dust, certain mineral oils, etc., does not show itself until after years of exposure.

Age and Industrial Safety

INDUSTRY to-day is using a greater proportion of older employees and not infrequently superannuated workers are returning to the factories. Mankind has been facetiously divided into the "quick" and the dead; the older workers cannot be classed as quick, and since their employers do not want them to be numbered among the dead the tendency has been to avoid the employment of older men, particularly in certain industries where the risks due to moving machinery and other accidents are somewhat greater than the average. This policy has been particularly noticeable in America where it has been widely believed that the older worker is more of an accident risk than is the younger worker. The contention in that country is that firstly the physiological changes which accompany age decrease the speed of the older worker's reaction to danger, thus increasing his chances of getting hurt; and second, that once injured his chances of recovery without a permanent impairment are less and that his period of recovery is longer than for the younger worker. An author in the American *Monthly Labour Review* has investigated this belief. His investigation shows that older workers are injured less frequently than younger workers; but once injured they experience proportionately more deaths and permanent impairments than do the younger workers. When injured the older workers take longer to recover so that they stay away from work for a longer time. The author, M. D. Kossoris, points out that the data cited are not to be interpreted as showing that injuries to older workers are on the average more costly to their employers than of those of the younger workers. It is an open question whether the less frequent but more severe injuries to older workers are more or less costly than the more frequent but less severe injuries to younger workers. The conclusion that we should draw from this investigation is that the experience and skill of the older workers make them desirable employees even though for certain work they may not be as quick as the younger ones. There is obviously no general ground for discriminating amongst workers on account of their age, within, of course, reasonable limits.

Stocking Coal

MOST industries depend on fuel or power; since fuel is necessary to generate power this comes to the same thing as saying that industry depends on coal. There is no doubt that the coal situation of the country is causing considerable disquiet. Official advice has been given to industry to accumulate reserve stocks of coal during the present summer in order to ease the possible transport difficulties during the coming winter. Unfortunately, the coal necessary to do this does not appear to be available and it seems probable that most works will start next winter with lower stocks of coal than they had last winter. Nevertheless, every opportunity should be taken of accumulating stocks. Of almost equal importance with the accumulation of stocks is economy in the use of coal. Most large works now have a fuel technologist whose job it is to ensure that heat and power shall be used economically. The economies that must be rendered possible by the employment of such a man are highly important and will frequently pay his salary many times over. Too often management takes the short-sighted view that capital expenditure is more important than saving in running costs. An example brought to our notice concerned a chemical works which had established itself in premises formerly occupied by a larger concern. The size of the boiler was very much too great, with the result that approximately 1 lb. of steam was generated per lb. of coal burnt; moreover, the coal used in this boiler was of the large and expensive variety usually sold as second-quality house coal. In these circumstances the cost of steam was enormous, but the management preferred this constant expense to that of spending a few hundred pounds in putting down an efficient steam-raising plant. It is not easy to purchase anything constructed in steel to-day, but steam boilers can still be obtained second-hand or from stock, and new boilers can be bought with quite reasonable times of delivery. Very often gas, electricity, or coke can be used in place of coal with advantageous results, but at present this should only be done where a distinct economy of coal can be secured. The Government expects industry generally to use coal with the highest possible efficiency during the period of the war, and all works managers should look into the problem of increasing the efficiency of fuel and power utilisation.

Titanium Tungsten Carbide Cutting Tools

Methods of Analysis

by JOSIAH W. JONES, M.Sc.

THE national importance of machine tools has produced many problems of manufacture and there are in this country a number of laboratories tackling analyses of the kind here described. It is hoped that the data which follow, derived from first-hand experience, will be helpful to metallurgical chemists.

The reagents required for the analysis are as follows :—

Cinchonine solution.—125 gm. cinchonine dissolved in a mixture of 500 c.c. HCl (sp. gr. 1.19) and 500 c.c. distilled water.

Cinchonine wash solution.—Dilute 30 c.c. of the above solution to 1 litre.

Sodium carbonate.—10 per cent. aqueous solution.

Ammonium acetate.—5 per cent. aqueous solution.

Potassium permanganate.—0.01 N; 0.316 gm. $KMnO_4$ per litre.

Ferrous ammonium sulphate.—0.01 N; 3.91 gm. $FeSo_4(NH_4)_2$, $SO_4.6H_2O$ per litre. (1 c.c. = 0.000558 gm. Fe).

Sodium hydrogen sulphite.

Dimethylglyoxime.—1 per cent. solution in alcohol of ammonium hydroxide (10 c.c. of this solution precipitates .015 gm. nickel).

Hydrofluoric acid.—Pure (48 per cent. solution).

Anhydrous sodium carbonate.

Potassium pyrosulphate.

Sulphuric-hydrochloric acid mixture.—20 c.c. H_2SO_4 (sp. gr. 1.84), 300 c.c. HCl (sp. gr. 1.19).

Sodium hydroxide.—10 per cent. solution in water.

Cupferron.—5 per cent. solution in water.

8-Hydroxyquinoline.—2 per cent. solution in 6 per cent. acetic acid solution.

Preparation of Sample

Extract the carbide tip from the shank by melting the brazing solder, and clean the surfaces of the tip by grinding free from solder. Crush the tip with an iron percussion pestle and mortar (the interior must be polished and every precaution taken to avoid contamination with iron) and grind the powder with an agate pestle and mortar until it will pass through a 90-mesh sieve.

Carbon may be determined by combustion in a manner similar to the estimation of carbon in steel, with certain changes in detail. Weigh out not more than 0.25 gm. of sample and spread it evenly on the bottom of a porcelain boat in order to expose the maximum surface. No oxidising additions are necessary. Arrange for combustion to start at a dull red heat, proceed up to 1000° C., and continue for 30 minutes. Carbon content is calculated from the increase in weight of the apparatus which is used to absorb the carbon dioxide.

Cobalt.—Place 0.25 gm. of the finely powdered sample in a 25 c.c. porcelain crucible and ignite at a temperature not exceeding 750° C. for 30 minutes. Extract from the furnace, stir well with a platinum wire and ignite again for a further 15 minutes. Cool, transfer the ignited residue into a 400 c.c. beaker containing 100 c.c. of concentrated hydrochloric acid and 2 c.c. of bromine. Cover, and place on hot plate to simmer gently. Treat the crucible with a similar solution and add its contents to the beaker. When reactions of solution are complete add 5 c.c. of concentrated nitric acid and boil for 30 minutes. Wash in the cover glass and evaporate to dryness observing the usual precautions against spitting. Bake for 30 minutes. Cool and extract the residue with 20 c.c. of concentrated hydrochloric acid, boil and digest; when solution is complete dilute to 300 c.c. with water and add 10 c.c. of cinchonine solution to the boiling solution. Allow to stand for 15 minutes. Filter through a close ashless filter paper and wash with 50 per cent. hydrochloric acid solution and then with water until free from chlorides. Dry the paper and ignite at a temperature not exceeding 750° C. Reserve the filtrate and re-treat the ignited precipitate with brominated hydrochloric acid as before. When solution is complete add 1 c.c. nitric acid and dilute to 300 c.c. with water. Add cinchonine solution, boil and filter again. Join the filtrates which contain iron, aluminium, cobalt, and nickel. Ignite the precipitate which contains silicon, tungsten, and titanium.

Evaporate the combined filtrates to 100 c.c. and neutralise by adding solid sodium carbonate until the acid is nearly destroyed and continue adding 10 per cent. sodium carbonate solution until the solution is amber-coloured and the precipitate redissolves only with difficulty on continued stirring. Warm the solution and pour it slowly into a 400 c.c. beaker containing 200 c.c. of boiling 5 per cent. ammonium acetate solution. Boil for three minutes and allow precipitate to settle. Filter off ferric hydroxide through open paper. Redissolve the precipitate in 50 per cent. hot hydrochloric acid and repeat the basic acetate separation under the same conditions. Reserve the precipitate and join the filtrates. Boil down the volume to 100 c.c., cool, add 5 c.c. of conc. sulphuric acid and neutralise with ammonium hydroxide (0.90), using an indicator of litmus paper. Add 35 c.c. in excess and 2 gm. of sodium hydrogen sulphite. Electrolyse overnight in a volume of 150 c.c., using a current density of 0.2 to 0.3 amps./dm². Wash the cathode with cold water, dry at 100° C., and weigh as cobalt. Determine if any nickel is present by dissolving the deposit in conc. nitric acid. Make the solution just ammoniacal, using litmus indicator, and add 10 c.c. of dimethylglyoxime solution. Allow solution to stand in a warm place for at least 24 hours. Filter and wash precipitate with water and place paper and precipitate in a porcelain crucible. Fold a wet ashless paper and pack into the top of the crucible to cover the contents completely. Ignite, cool and weigh as NiO. Hence calculate nickel present, and by difference the content of cobalt. Test the electrolyte for tungsten by acidifying the boiling solution with hydrochloric acid and adding cinchonine solution. The result should be negative on standing for 24 hours.

Determination of Iron

Iron and Alumina.—Ignite the precipitate from the basic acetate separation of cobalt at a dull red heat and weigh the combined precipitates. Redissolve in 20 c.c. of 50 per cent. sulphuric acid in water. Any undissolved residue of titania is filtered off and added to the precipitate containing the titania. Reduce the iron to the ferrous condition by diluting the solution to 200 c.c. and adding iron-free zinc. Test for the presence of unreduced iron by taking drops of the solution and placing them on drops of 10 per cent. ammonium sulphocyanide on a white tile. A red colouration indicates ferric iron. Add more sulphuric acid if necessary to maintain the evolution of hydrogen. When reduction is complete filter off the remaining zinc through a pad of glass wool in a funnel. Wash with warm water and titrate with N/100 potassium permanganate which has been standardised. Calculate the iron present and from this figure the ferric oxide present in the precipitate from the basic acetate. To this figure add the weight of the undissolved titania present in the combined precipitates, and subtract from the weight of the combined precipitate to obtain the content of alumina. It is assumed that aluminium present on the tool would be oxidised to alumina by the process of manufacture.

Silicon.—Ignite the mixed precipitates from the solution of the sample to remove filter paper at a temperature not exceeding 750° C. (or tungstic oxide may be lost) in a weighed platinum crucible and weigh residue. Moisten the contents of the crucible with a few drops of conc. sulphuric acid and 2 c.c. of pure hydrofluoric acid. The purity of

this reagent is important. Heat to dryness very slowly to avoid spitting and then ignite to 750° C. for 15 minutes. Cool and weigh. Loss of weight multiplied by 0.4676 is the weight of silicon. Calculate the percentage.

Titanium.—To the platinum crucible add 1 gm. of anhydrous sodium carbonate and heat slowly up to a bright red heat and maintain for 30 minutes. Prepare a solution of 10 gm. of sodium hydrate in 100 c.c. of water. Cool and wash the outside of the crucible and place the whole into the solution. Boil gently until the fused mass is loosened and extracted. Remove the crucible with a glass rod, washing the whole thoroughly with water. Simmer gently on hot plate to complete solution of the tungstic oxide. Dilute to 300 c.c. with hot water, boil, and filter through a close ashless filter paper. Wash with water till free from alkali and retain precipitate No. 1 of titania. Neutralise filtrate with 20 per cent. hydrochloric acid finally dropwise until the colour of phenolphthalein is just discharged Allow beaker to stand in a warm place overnight and discharge colour as it reappears. Filter off the second precipitate of titania and wash with hot water. Join precipitates, ignite at temperature not exceeding 750° C. cool, and weigh.

If operations have been carried out carefully this precipitate of titania is pure and can be weighed as such, but there may be some contamination with tungstic oxide. Refuse precipitate in potassium pyrosulphate in platinum crucible, first fusing some of the salt, then cooling and brushing on precipitate, add more salt, and fuse for 30 minutes. Cool crucible, wash outside, and extract with solution of 20 c.c. of conc. sulphuric acid and 30 c.c. of conc. hydrochloric acid. Dilute to 250 c.c., cool, and filter off any precipitate of tungstic oxide. Add 5 c.c. of saturated sulphurous acid and excess of a 5 per cent. solution of cupferron. Allow to stand for two hours, filter in close filter paper, wash with 10 per cent. hydrochloric acid containing a little cupferron in solution, and ignite gently at first and finally to 800° C.

$$\frac{\text{Weight of precipitate} \times .6005}{\text{Weight of sample}} \times 100 = \text{per cent. titanium}$$

Tungsten.—Acidify the filtrate from titanium precipitation with hydrochloric acid and to the boiling solution add 10 c.c. of cinchonine solution. Digest the solution in a warm place for an hour, filter through a close ashless filter paper, and wash with a hot solution of 10 c.c. of cinchonine solution diluted to one litre. Ignite filter paper at a temperature not exceeding 750° C. and weigh as WO_3. The filtrate should be allowed to stand overnight in anticipation of further precipitation and WO_3 separated from titania should be added.

$$\frac{\text{Weight of precipitate} \times .7391}{\text{Weight of sample}} \times 100 = \text{per cent. tungsten.}$$

Direct Determination of Alumina

Ignite 0.25 gm. of the powdered sample under conditions already described. Prepare a platinum crucible by fusing in it 1 gm. of anhydrous sodium carbonate. Cool and brush on to this fused carbonate the ignited residue. Cover with more carbonate and fuse again for 30 minutes. Wash outside of crucible and extract with sodium hydrate solution by methods described. Obtain and join the two precipitates of titania which will also contain iron. Make the faintly acid filtrate ammoniacal and boil off all excess. Filter off the precipitate of alumina through an open ashless paper, wash with hot water, ignite, and weigh as alumina To confirm the purity of this precipitate, redissolve in hot 50 per cent. hydrochloric acid and dilute the solution, so that 100 c.c. contain about 0.02 gm. of aluminium. Add 15 c.c. of hydrogen peroxide, heat to 60/70° C. and add a slight excess of 8-hydroxyquinoline solution Add a large excess of solid ammonium acetate to neutralise the mineral acid. Allow to stand for an hour in a cool place. Filter off the white precipitate through an open ashless paper. Transfer to a weighed porcelain crucible and cover with a layer of anhydrous oxalic acid. Char and ignite in a bright red heat. Weigh as alumina. Phosphorus if present, except as a trace, would contaminate this precipitate and must be determined.

If preferred, the precipitate may be collected in a weighed sintered glass crucible, filter porosity No. 4. Wash with 5 per cent. acetic acid in water and dry at 110° C. Precipitate contains 11.05 per cent. alumina.

SPECTROCHEMICAL ANALYSIS.

Si	...	present
Mn	...	slight indication
N	...	present
Cr	...	slight indication
Mo	...	,, ,,
V	...	trace
Al	...	indicated
Cu	...	,,
Fe	...	present
Zr	...	indicated
W	...	present
Ti	...	,,
Co	...	,,

CHEMICAL ANALYSIS.

C	7.7
W	55.0
Ti	22.2
Co	7.2
Fe	3.6
Al_2O_3	3.4
Si	0.5
	99.6

SIGNIFICANCE OF ABOVE TERMS.

Present = major constituent, more than 1.0 per cent.
Indicated = 0.1 to 1.0 per cent.
Slight indication = less than 0.1 per cent.

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Wool Wax Alcohols

A New English Manufacture

WHILE wool wax has been manufactured for some time in Germany, it is only recently that a large plant for its continuous manufacture has been built by Croda, Ltd., of Goole, in England. It is produced from purified wax alcohols of wool fat and is known as "Hartolan" wool wax. It consists mainly of a group of monovalent unsaturated hydroaromatic alcohols (sterols), all of which have a cyclopentano-perhydro-phenanthrene nucleus; these alcohols are of the cyclic series and of high molecular weight. The approximate composition is of cholesterols (mainly oxycholesterol); alcohols such as carnaubyl, ceryl, and myricyl, members of the aliphatic series; and alcohols of unknown composition, including some of the allylic series. The two latter groups make up 35 per cent. of the total Hartolan. It is a yellow wax-like substance, crystalline in appearance, and brittle at about 10° C. At lower temperatures it can easily be powdered, but though it sets hard and assumes a bright smooth appearance, it will not take a polish. Hartolan is soluble in all the important fat and oil solvents, is stable in the presence of oxidising agents, and does not become rancid. Another important feature is its high melting point (60°C.) in comparison with other mineral waxes.

Hartolan provides a valuable source of cholesterol; for practical purposes it may be regarded as a form of cholesterols reduced with 35 per cent. fatty matter of "dilute cholesterols." The emulsification properties of Hartolan are such that almost any fatty or oily substance in which from 2 to 5 per cent. of the product is dissolved will take up substantial quantities of water. The emulsions are of the water-in-oil type and are neutral, allowing acids such as tartaric, citric, etc., to be incorporated in them without causing instabiliy. The oil-in-water type of emulsion is easily obtained by using Hartolan as the oil phase and employing lecithin, sodium or potassium soaps, triethanolamine soaps, etc., as the emulsifying agent. Besides pharmaceutical and cosmetic uses, Hartolan can be used as a dispersing and softening agent in the rubber industry and as an anti-corrosive, in addition to its employment in lubricants, textiles, and inks.

Safe Practice in the Chemical Laboratory

I.—Planning for Safety

by JOHN CREEVEY

POTENTIAL hazards in the chemical laboratory can be more numerous than in chemical manufacture or processing on an industrial scale in the works, when work in the laboratory is largely experimental rather than routine. But owing to the additional element of care that is normally exercised in laboratories the majority of these hazards are avoided. Nevertheless, there are still risks of fire and explosion, of poisoning or danger to health, as well as of mechanical injury, in the common routine of laboratory work.

* * *

A considerable number of common accidents which are likely to arise are avoided by care in the planning of the laboratory, as regards lay-out and fixtures. Good lighting, for instance, is of outstanding importance. Bad lighting, whether natural or artificial, does not promote good work; it easily induces conditions of working where there is noticeable lack of attention to small details, as well as of commonsense caution. Natural lighting should be utilised to the fullest advantage; this is done best by providing windows on the north side of the room, or in the case of roof light by having only the north aspect glazed. With north light there is no direct sunlight, and this absence of sunlight avoids sun haze, apart from allowing the atmosphere to be better tolerated on a hot day. Natural daylight, however, should be properly diffused, most simply by adopting a light buff colour for all wall surfaces. For artificial lighting with overhead fixtures of the semi-indirect type, one 300-watt electric bulb should be allowed for each 80 to 100 sq. ft. of ceiling area. The ceiling should be perfectly flat, with a soft white surface to assist the reflection of light to and from the walls.

* * *

Planning to avoid possible accumulations of dust and dirt in the preferred arrangement of benches, cupboards, and shelving, contributes indirectly to safety A laboratory that is easily kept clean continuously promotes the welfare of the workers, who gain psychologically in the execution of their routine tasks and should show no tendency to become careless or slovenly. Shelving and cupboards that encourage the storing of reagents and apparatus in methodical order and under ideal conditions will be found to promote orderliness in the ultimate assembly of apparatus on the work-benches. Shelves for reagents, for instance, are not just the simple matter that they may seem to be. They are preferably provided in two distinct widths, the narrower placed above the wider, for safety reasons quite apart from the ease with which bottles of different sizes can be accommodated. Strong acids and alkalies are best stored where precautions can be made against spillage. To have to reach over the work surface of a bench to place a large bottle of strong acid on a shelf can be decidedly hazardous. It is much more satisfactory to have shallow troughs at bench level, lined with corrosion resisting material and provided with a mat of thickly woven asbestos.

* * *

It is desirable to see that healthy ventilation can be achieved without the use of open windows. The open window allows the infiltration of dust from adjoining works, and also draughts which may easily extinguish the flame of a burner that has been regulated to a very low gas consumption; a bad draught can equally well give hazardous conditions where a tall flame is being used unattended. In adopting artificial ventilation by electric fan with suitably arranged ducts, it is also desirable that direct draughts or air currents near the corners of a room should be avoided. Artificial ventilation, however, does not entirely obviate the need of having natural ventilation as well; the latter is best provided by louvres, which may be opened or closed at will, in the upper part of all windows, as well as sufficient fanlights in window spaces (for use should occasion arise) and in any glazed roof.

* * *

Fume cupboards should have top draught as well as bottom draught, either of which may be put to use. Fumes are preferably carried away by suction from an electric fan, rather than that induced by a gas flame in the fume pipe. The lighting of a gas flame can be overlooked, whereas the absence of the low hum of an electric fan in operation is soon noticed. A fan of 30 inches diameter, driven at 500 r.p.m., is needed to handle the removal of fumes from a total cupboard space of 150 cu. ft. It is also well to remember that the proper degree of ventilation cannot be attained if the blades of the fan become broken away by corrosion; for this reason periodical inspection is needed, unless the fan is made of some recognised corrosion-resisting metal or acid-proof stoneware.

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The windows of fume cupboards should be made of safety glass, and artificial lighting must have vapour-proof casings. Windows that slide horizontally are preferable to those which rise and fall. If windows of the rise-and-fall type are used, they should have easy-running steel chains rather than steel wire, and certainly not sash cords.

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In general plan, the work-benches in the laboratory should be so arranged that no worker will be hampered by the movements of others. No bench should be made difficult of access, or placed immediately adjacent to a fume cupboard or some other feature of the room which is common to all users. Benches with flat tops, and low racks at bench level for reagents, are better than other types. This "open type" of laboratory bench contributes to a common feeling of co-operation in the matter of safety among the workers. The housing of stools in out-of-the-way recesses beneath the work benches, when not in use, aids in avoiding the common accident of falling over them.

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If a first-aid cabinet is installed—as it should be—it should be placed at a corner of the laboratory where it is as far removed as possible from all hazardous features. Adjacent to it there should be a small sink reserved for washing hands and face which have made contact with anything corrosive or poisonous. Here should also be a vertically-projecting jet for water, over which it is easy to place the eye for rinsing away an accidental splash of acid. Provision should be made for a fire blanket, as well as fire extinguishers. Electrical current and gas service pipe to all points in the laboratory should be capable of being cut off when necessary at a point close to the door of each room, with a separate control for the lighting circuit placed at higher level where it can be reached only if really needed. Laboratories which are constantly handling inflammable liquids and vapours should have lighting fittings which are of the vapour-proof type.

NEW SOUTH AFRICAN LABORATORY

The research laboratory for the department of chemistry in the new Hillman Building of the University of the Witwatersrand, opened in June, possesses many of the features described above. In connection with the main laboratory there are six smaller rooms, two for staff, and accommodation for a distillation room, a combustion room, a dark room, and an autoclave room. The chief feature of the laboratory is the fact that all services to the benches are so designed as to give an uninterrupted flat surface throughout. Vacuum is supplied to 25 points by means of an Edward vacuum unit, thus largely eliminating the wasteful use of water pumps. The distillation room is arranged so that all inflammable materials may be distilled out of contact with the main laboratory.

Chemical Matters in Parliament

German Imports from the U.S.S.R.

REPLYING to a question from Mr. Hughes in the House of Commons last week, Mr. Foot, in a written answer, stated that during the past 18 months Germany had imported from the Soviet Union substantial quantities of essential war materials, including cereals, oil, timber, manganese, chrome, apatite, and cotton. Oil imports for this period were in the neighbourhood of 1,000,000 tons and included lubricants and aviation spirit. In addition, the Trans-Siberian Railway was Germany's only link with the Far East, and during recent months goods had been reaching the Germans by this route at the rate of well over 500,000 tons a year, consisting mainly of animal and vegetable oils and fats, but also including rubber, tin, copper, and tungsten. The immediate results of Germany's unprovoked aggression against the Soviet Union was, of course, to cut off all further supplies from and through Russia. Nor, as things were, could these be replaced by German imports from any other source.

Fats for Soap Manufacture

Mr. David Adams asked the Parliamentary Secretary to the Ministry of Food, whether in view of the fact that there was a shortage of fats to fish friers, whereas soap manufacturers were receiving 100 per cent. of their ration, it had been decided to end that discrimination.

In a written reply, Major Lloyd George stated that owing to the supply position the total quantity of oils and fats for fish friers cannot at present be increased. Most of the raw materials used in soap making, however, were unfit for edible purposes and so could not be used to meet the requirements of fish friers. Moreover, it was specially important to maintain the output of soap at a high figure, in view of the necessity for producing the maximum quantity of its by-product, glycerine, which was urgently required for munitions.

New Control Orders

Molasses and Alcohol

THE Minister of Supply has issued the Control of Molasses and Industrial Alcohol (No. 13) Order, varying the No. 11 Order and bringing under licence as from August 7 all molasses, however small the quantity. No licence will, however, be necessary for molasses used as food for stock where the consumer acquires less than six tons in all in any period of six months. Inquiries should be addressed to the Molasses and Industrial Alcohol Control, Great Burgh, Epsom, Surrey (S.R. and O. 1941, No. 1142).

Tertiary Butyl Alcohol

The Treasury has made an Order entitled The Safeguarding of Industries (Exemption) No. 4 Order, 1941, under the Import Duties (Emergency Provisions) Act, 1939, exempting tertiary butyl alcohol from key industry duty from August 11 to December 31, 1941.

Copies of the above orders can be obtained from H.M Stationery Office or any bookseller, price 1d.

DANGEROUS FUMES

The fact that certain specific precautions must by law be taken before persons enter a confined space in which dangerous fumes, *e.g.*, benzene vapour, nitrous fumes, sulphuretted hydrogen, etc., are liable to be present is now fairly well recognised. What may not be fully appreciated is that this term "dangerous fumes" has a very wide meaning, embraces atmospheres which are not poisonous, toxic, or anæsthetic according to the usual meaning of these words, and covers any atmosphere which is deficient in oxygen to an extent which makes it hazardous to life. Such conditions are frequently found where there is an evolution of carbon dioxide (*Industrial Accident Prevention Bull.*, 1941, 9, 97).

Latin-American Chemical Markets

Increasing Purchases of Empire Chemicals

(*From a Special Correspondent*)

IN recent years four of the Latin-American countries have been outlets for sodium compounds and other inorganic chemicals, Mexico being a heavy purchaser. British Honduras has taken a total of very large value in these sodium compounds, while Cuba and Venezuela have imported considerable quantities of other chemicals. In 1932 there were no shipments to British Honduras, but exports to the other three countries named ran to large figures. After 1932, other markets were found for these chemicals, *e.g.*, in Nicaragua, Salvador, Costa Rica, Panama, Guatemala, Chile, Peru, Paraguay, and Ecuador, and in 1937 the aggregate exports to Latin-America were heavy. In 1940 their value rose still higher. Shipments of sodium compounds last year were made in large quantities to Mexico, whose share was over 80 per cent. of the total value, the balance going to Honduras, Peru, Nicaragua and Ecuador.

Exports of calcium carbide from Canada, which were limited to three of the Latin-American countries in 1939, were distributed among 16 of the 21 Republics in 1940. Aggregate Canadian exports of calcium carbide to the South American group amounted to nearly £100,000, the chief destinations being Chile, Argentina, and Venezuela the remainder going to Bolivia, Colombia, Peru, Ecuador, and Uruguay. In the Caribbean area shipments were effected to Cuba, San Domingo, and the seven Central American Republics.

MANCHURIAN CHEMICAL PROGRESS

The President of the Chemistry Bureau of the Commerce and Industry Ministry of Japan, who has returned to Tokyo after completing a three weeks' conference with Manchukuo government officials concerning the erection of hydro-electric power plants on the Yalu and the Sungari rivers, stated that the project will provide motive power for chemical development in Manchukuo. Two large chemical factories, the plans for which include the use of the power generated by the two hydro-electric plants, are a light metals factory at Antung and a carbide factory at Kirin. The Yalu plant will start supplying power within the next two months and the Sungari plant by next year. The carbide factory will be capitalised at about 30,000,000 yen; most of the shares will be bought in Manchukuo, while the technical end of operations will be managed by Japan.

A CHEMIST'S BOOKSHELF

CHEMICAL SPECIES. By Jean Timmermans. London: Macmillan. Pp. 177. 18s.

This book was first published in 1928 under the title of "La Notion d'Espèce en Chimie" and has been translated by Ralph E. Oesper after the author, who is professor of Physical Chemistry at the University of Brussels, had made additions and alterations to bring the text up to date. The book is divided into four main parts; definition of chemical systems, pure materials, selection from the literature concerning the most suitable methods of purification, and lastly the most probable value of constants of pure materials. The treatment of these topics is as comprehensive as the space of the book allows; and by means of apposite examples it illustrates typical difficulties and gives solutions of problems which frequently confront every chemist interested in the preparation of pure materials and the appraisal of their purity. Numerous figures and diagrams are included, and there are many references in footnotes so that the subject under discussion can be studied at greater length if desired. The book will be useful not only to students, but also to advanced and professional chemists.

Improved Solder Fluxes*

An Interim Report on Current Research

THE search for a really non-corrosive flux that effectively prepares metals for soft soldering is by no means new and has not ended. It is obviously a tough problem when one considers that effective fluxing involves rapid cleaning of the metal surface to dissolve scale, oxide films and grease, in order to present a true metal to metal contact with the solder, yet the very factors that favour such action favour corrosive residues. Zinc chloride, the time-honoured flux, is effective when used with most metals, but frequently it leaves a corrosive residue, even after washing repeatedly with water. Likewise, the various inorganic and organic acids and chloride salts which are used as fluxes are often unsatisfactory as regards the non-corroding requirement. At the other end of the range of fluxes is rosin, sometimes called "the only non-corrosive soldering flux." Unfortunately, it is not effective except when used on relatively clean tinplate and copper. It does not flux steel or oxidised copper, nor does it promote the spreading of the solder, and is rather difficult to remove. Recent research, therefore, has been directed toward organic materials which are substantially non-corrosive when cold and leave water-soluble residues, yet can decompose when heated during soldering, to release an active, oxide-dissolving constituent.

One of the many difficulties in developing an improved flux is to find means of testing which give practical results. It is possible, however, to obtain indications of the qualities of improved fluxes by comparing certain properties, such as the effect of the flux on the surface tension, or flowability, of the solder, its effectiveness in removing oxide films, and its corrosion of the base metal. The general procedure followed in a recent investigation for the Tin Research Institute was to note the general fluxing characteristics of a large number of materials when spot soldering 14-gauge samples of oxidised copper, and slightly rusted, cold-rolled steel strip. By using exactly the same amount of solder each time and keeping all conditions similar, except the flux, it was possible to evaluate the flux qualitatively and to compare it with resin and zinc chloride as standards. The fluxes were rated as superior, excellent, good, fair, and no good. Rosin was rated fair, zinc chloride excellent.

Amine Salts of Organic Acids

Some of the organic acids, such as oleic and stearic, make active fluxes but are decidedly corrosive. Partial neutralisation with an alkali, such as caustic soda, to form a soap, does not eliminate their tendency to corrode. Neutralisation with organic bases, such as ammonia or an amine, offers interesting possibilities, however. In fact, some of the amines and amides, as ethylene diamine and acetamide, have been used as fluxes to a limited extent. Recent investigations have been concerned with ammonium and amine salts of stearic, oleic, and palmitic acids, particularly of stearic acid. Many of these salts have been found to be good fluxes for copper; some have appeared to be non-corrosive, and a few effectively flux steel. The stearic acid salt of diethylene triamine appeared particularly attractive as a flux for both copper and iron. It not only made an excellent effective flux, but did not decompose unduly and gave a residue that was as non-corrosive as rosin. Unfortunately, this flux has a disagreeable odour, hence it may not be adaptable where good ventilation is not available. The oleic acid salt of diethylene triamine also was found to be an effective flux on steel and copper, although it was more corrosive than the stearic acid salt. Unlike zinc chloride, it was not hygroscopic and was completely soluble in water without formation of an insoluble oxysalt.

The adjoining table gives the rating of stearic acid salts which appeared to be the best of their respective groups. A non-corrosive rating was given if no indication of a green corrosion product appeared on fluxed and soldered copper at the end of a month of observation in the laboratory. In a few cases a slight greenish colour developed while soldering, but did not extend on standing. Some of the fluxes decomposed rather rapidly if a relatively high soldering temperature was used, and in most cases proper ventilation was required to maintain good working conditions. Stearamide, produced by heating the ammonium salt of stearic acid, was found to be an excellent flux for copper and gave slight corrosion only while heating during soldering. One of the drawbacks of using the amine type of flux has been cost. In view of the progress made during the past few years in synthetic production of the amines, however, it is possible that their application will become increasingly practicable.

Stearic Acid Salt of	Fluxing Ability on Copper	Spreading Ability on Copper	Corrosive Action on Copper
Triethylamine	Superior	Superior	Corrosive
Triethanolamine	Superior	Superior	Non-Corrosive
Diethylene Triamine	Superior	Superior	Non-Corrosive
Acetamide	Superior	Excellent	Non-Corrosive
N-Butylaniline	Excellent	Excellent	Non-Corrosive
p-Aminoacetanilide	Superior	Superior	Non-Corrosive
o-Phenylenediamine	Superior	Superior	Non-Corrosive
p-Phenetidine	Exceilent	Superior	Non-Corrosive
l-Naphthylamine.	Excellent	Superior	Non-Corrosive
Morpholine	Excellent	Superior	Corrosive

*From an article by Howard Peters and Bruce Gonser, D.Sc., of the Battelle Memorial Inst., Columbus, Ohio, in *Tin and its Uses*, 1941, *10*, pp. 9-10.

Empire Minerals for the Paint Industry

Grinding Equipment Necessary

AT a meeting of the London Section of the Oil and Colour Chemists' Association held at the Federation of British Industries, Tothill Street, S.W.1, on August 7, Mr. Sydney J. Johnstone, B.Sc., F.I.C., Principal of the Mineral Resources Department of the Imperial Institute, gave a lecture on "Minerals for the Paint Industry." Mr. Johnstone indicated the principal home and imperial sources of the chief minerals utilised in the British paint industry either as pigments, extenders, fillers or suspending agents. He examined the position in regard to each mineral product in great detail, and also systematically in accordance with their properties, and the Chairman (Dr. H. W. Keenan) justly described the lecture as "really magnificent."

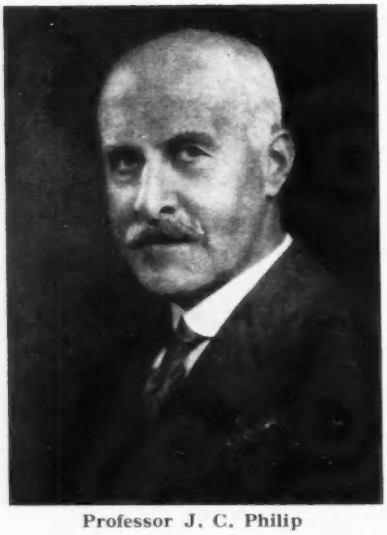
In his concluding remarks, Mr. Johnstone indicated that many of our home producers were making creditable efforts to meet the demands of the paint industry for certain minerals. A number of abandoned deposits of barytes, micaceous hæmatite and ochres had been reopened, and in some cases the output of mines in operation before the war had been considerably increased. For many mineral products used in the paint industry we were still wholly or in part on imported materials, but fortunately our overseas Empire could supply us with many of these if shipping space was available. Efforts had also been made by firms working deposits of china-clay and fuller's earth to produce substitutes for imported suspending agents such as bentonite and asbestine. The large production of camouflage paint had given rise to a rather unusual demand for relatively coarsely ground minerals, especially slate and quartz sand, and there was an outlet for off-coloured ochres which were normally unsaleable. At the moment there seemed to be a shortage of grinding capacity, particularly for producing the finer grades, and little attention appeared to have been given to the production and utilisation of micronised minerals which were imported to a small extent from Norway before the war.

A World-Famous Chemist

Sudden Death of Professor Philip

As was briefly announced in our last week's issue, Professor J. C. PHILIP, O.B.E., F.R.S., D.Sc., LL.D., died suddenly in a nursing home on August 6, at the age of 68. With his death the science and industry of chemistry loses an outstanding figure, a chemist who ranked among the most distinguished and best known personalities in the profession. The loss will be all the more keenly felt because of its unexpectedness; Dr. Philip, as retiring president of the Society of Chemical Industry, played a prominent part at the annual meeting of the society just over a month ago, and there can have been few members then present who did not expect to see him again at the adjourned meeting last Friday.

James Charles Philip was a son of the manse, and was born at Fordoun, Kincardineshire, on February 12, 1873. He was educated at the Grammar School and University of the near-by city of Aberdeen, where he won the Town Council Medal in 1893 and the Murray Scholarship in 1895. After a period at Göttingen, followed by work at Cambridge, his long association with London University began when he was appointed lecturer and demonstrator in chemistry at the (then) Royal College of Science in 1900.



Professor J. C. Philip

An assistant-professorship followed in 1909, and in 1919 Philip was appointed Professor of Physical Chemistry at the Imperial College. He held that chair until 1938 and during the last six years of this period he was a member of the Senate of the University. He retired in 1938 with the title of Professor Emeritus.

In 1939 Professor Philip was elected President of the Society of Chemical Industry, and he held that office until last month, when he consented to continue serving as a vice-president of the society. He had also served as secretary of the Chemical Society in 1913-24 and chairman of the Bureau of Chemical Abstracts in 1923-32. Always a keen supporter of the British Association, he presided over Section B in 1936, and in 1938 was appointed a member of the committee that managed the division of Social and International Relations of Science.

For his work in the last war he received the O.B.E. in 1918; in 1921 he was elected a Fellow of the Royal Society, and last April he was chosen as President of the Chemical Society. At the same time he was awarded the degree of LL.D. by the University of Aberdeen.

Philip's most widely known publication was "The Romance of Modern Chemistry," which appeared in 1909. Later books were "Physical Chemistry: its Bearing on Biology" (1910) and "Achievements in Chemical Science" (1913). He also contributed many articles to "Thorpe" as well as original papers to the Chemical Society's journal.

The funeral service, held at St. John's Presbyterian Church, Kensington, W.8, on August 9, was attended by many distinguished chemists and other scientists, including the President and Secretary of the Royal Society; the Vice-President, General Secretary, Hon. Secretary and Librarian of the Chemical Society; the President and Assistant-Secretary of the Institute of Chemistry; the President, Secretary, and other representatives of the Society of Chemical Industry; and representatives of the British Association of Chemists, the Faraday Society, the Society of Public Analysts, the Science Library, and universities throughout the country.

Personal Notes

MR. A. P. QUARRELL, A.M.I.Mech.E., is resuming his duties as London manager of Petters, Limited.

MR. A. C. RYLAND has been appointed commercial manager of British Basic Slag, Ltd.

MR. G. T. SHIPSTON, B.Sc., F.I.C., has been appointed Director of Fruit Juices and Pectin in the Ministry of Food.

MR. JOHN S. FORD, F.R.S.E., F.I.C., will be presented with the Horace Brown Medal at a special meeting of the Institute of Brewing, to be held at the Caledonian Hotel, Edinburgh, on September 12.

MR. ARTHUR MORTIMER, O.B.E., Secretary of the Wholesale Drug Trade Association and Chairman of the Pharmaceutical Export Group, has been appointed Assistant Director of Medical Supplies at the Ministry of Supply.

MR. GILES NEWTON, whom Lord Beaverbrook has appointed to the new post of Controller of Inspection (Administration) in the Ministry of Supply, is a director of the Cape Asbestos Co., Ltd.

DR. J. S. ANDERSON, senior lecturer in inorganic chemistry in the University of Melbourne, has been awarded the Grimwade prize in industrial chemistry for 1941.

MR. F. HARTLEY, B.Sc., A.I.C., has been awarded the degree of Ph.D. in the Faculty of Science, London University, for a thesis entitled "Physico-Chemical and Synthetic Studies on the Structure of γ-Fructose." Mr. Hartley is now chief chemist and joint works manager to Organon Laboratories, Ltd., biological chemists, London, W.1.

Obituary

MR. F. W. HAMPSHIRE, who died recently at the age of 76, was chairman and managing director of F. W. Hampshire and Co., Ltd., manufacturing chemists, Derby.

MR. JOSEPH METCALF, who died recently, has been in business as a fertiliser manufacturer in Argyle Street, Accrington, for about 40 years.

GROUP CAPTAIN JOHN EDWARD TENNANT, D.S.O., M.C., J.P., Commandant of the Air Training Corps in Scotland, whose death in a flying accident in Scotland was announced last week, was a son of Mr. Francis J. Tennant, managing director of Charles Tennant and Co., Ltd., chemical manufacturers and brokers, Glasgow. Group Captain Tennant, who was in his 51st year, was a director of C. Tennant, Sons and Co., Ltd., metal merchants, Mincing Lane. He was a notable yachtsman, a fine shot and an Arctic explorer of distinction. He had served in all three fighting services. After two years as midshipman, R.N., he transferred to the Scots Guards in 1910, and was seconded to the R.F.C. in 1914, flying in France and Iraq. In 1919 he was Director of Aeronautics in Iraq, and on the outbreak of war in 1939 he rejoined the R.A.F.

The Polarising Microscope

An Instrument for the Chemical Industry

POLARISING microscopes are among the most useful of optical instruments. They require the utmost ingenuity and most exacting precision in their manufacture, but, thanks to their complete equipment, they are extremely useful and assist workers in widely varying fields of the chemical industry—mining, textile, ceramic, food, petroleum, metal, paint, paper, rubber, etc. They are useful in routine control, in analyses, and in research.

Users of the earlier polarising microscopes will remember the change in magnification, shift of focus due to astigmatism, which resulted when the tube analyser was inserted. Optical engineers have worked out a method for overcoming these difficulties and now tube analysers are corrected for all three conditions—focus difference, magnification and astigmatism. Another point which is carefully considered in the design and construction is the strain-free condition of the optics themselves, as well as the necessity for mounting all optical parts, such as objectives, condensers, covers for polarisers and analysers, free from mechanical strain. Only in this way can a perfect polarising microscope be made available. An instrument equipped with a strained condenser or objective will not show clear, sharp interference figures, for with no specimen on the microscope the field will not have perfect extinction, and the aperture of the objective will appear partially bright instead of evenly black.

A Way to New Discoveries

There are many persons who have never used polarising microscopes in their daily work, for whom such an instrument would offer new methods of control and investigation, and possibly lead to new discoveries. These persons may range from the mineralogist who has not used a polarising microscope since his college days to the textile chemist who is just beginning to realise, from the literature, how much can be done in fibre identification. The polarising microscope, equipped simply with a fixed polariser and analyser, was much used in the early days of microscopy and is now taking its place in industry in a somewhat more elaborate design. It will perform those functions of the ordinary microscope and go a great deal further in determining properties and characteristics which could be determined in no other way. It may, therefore, be well to point out to those who have forgotten, or who are making their acquaintance for the first time, the many uses of this instrument.

All transparent substances may be examined advantageously with the polarising microscope. Such substances fall into one of two classes. Either they are optically homogeneous, that is, have but one refractive index; or they are optically heterogeneous, and have more than one refractive index. The first are called isotropic and the second anisotropic. The latter type comprises most of the transparent objects studied in polarised light. They may be characterised and identified by extinction angle, birefringence, optic axial angle, optical elongation, optic sign, interference figure, etc.

The use of a polarising microscope is no longer confined to the field of petrography. Dr. Emile Chamot was a pioneer in the use of the polarising microscope in chemical microscopy. This field in turn has spread to embrace most of the industrial phases of chemistry and to-day we are not surprised to find the optical characteristics of organic chemicals incorporated in the International Critical Tables. We read from time to time in the textile journals of work being done on textile fibres with the polarising microscope, of the degree of nitration in certain rayons being determined by means of the polarising microscope. We read of a metallographer using polarised light in connection with vertical illumination to carry on his researches. We learn of the investigation of slags and the determination thereby of mineral composition, which is extremely important in connection with the chemical composition. The mining industry is using the polarising microscope with vertical illumination to examine ores and metals that are not transparent and cannot be examined in thin sections. The botanist and zoologist frequently find it possible to differentiate between otherwise similar cells by means of the same instrument.

For those familiar with the conventional crystallographic or petrographic method, a thorough investigation is recommended of the new universal stage with the extra added motion, which does away with much calculation in the measurement of optic axial angles. The possibility of the Emmons double variation equipment should likewise be examined, as providing a most accurate means for determining the refractive index of small crystal grains. These equipments are finding a wide field in soil mineralogy and similar work.

British Chemical Prices

Market Reports

TRADE in general chemicals continues to pursue an active course, and on the whole the market shows little change from the conditions reported last week. Actual price movements have been few, though an upward tendency is reported from quite a number of sections. There is a good request for barium compounds, the solvents and heavy acids. In the potash section movements continue to be restricted by the supply position and quotations for some items are nominal. A moderate volume of business has been transacted in the market for coal tar products, dealers generally being occupied with existing contract commitments. Values continue steady with a decidedly firm undertone.

MANCHESTER.—Holiday influences are still a factor to some extent on the Manchester chemical market, although these are affecting the volume of fresh business rather than the general movement into consumption against contracts placed during recent weeks. Most of the soda products are being called for in steady quantities, and a fair demand is reported in the ammonia and magnesia compounds, whilst most of the heavy acids are being well absorbed. Inquiry for the tar products has been somewhat slower, though here again contract deliveries have been well maintained and the price position is strong pretty well throughout the range.

GLASGOW.—There was no change in the Scottish heavy chemical market during the past week. Home business was steady, and export inquiries limited. Prices remain firm.

Price Changes

Ammonium Phosphate Fertilisers.—Type B, £13 18s. 9d. per ton in 6-ton lots, d/d farmer's nearest station in August.

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station: August delivery, £9 11s. 6d. Increase of 1s. 6d. per ton for every month up to £10 0s. 6d. in February, 1942; March June, 1942, £10 2s. Rebate per ton on future deliveries: August, 22s.; September, 16s.; October, 10s.; November, 6s.; December, 2s.

Concentrated Complete Fertilisers.—£14 8s. 9d. per ton in 6-ton lots, d/d farmer's nearest station in August. Supplies small except C.C.F. Special.

Cresylic Acid.—Pale, 99/100%, 3s. per gal. MANCHESTER: Pale, 99/100%, 3s. 6d. per gal.

Hydrofluoric Acid.—59/60%, about 6d. per lb.

Naphtha.—Solvent, 90/160°, 2s. 4d. to 2s. 8d. per gal.; Heavy, 90/190°, 1s. 10½d., naked at works. MANCHESTER: 90/160°, 2s. 6d. to 2s. 9d.

Nitro-Chalk.—£9 14s. per ton in 6-ton lots, d/d farmer's nearest station in August.

Sodium Metasilicate.—£15 15s. per ton, d/d U.K. in 1-ton lots.

Sodium Nitrate.—Chilean super-refined for 6-ton lots d/d nearest station, £15 per ton; granulated, over 98%, £14 10s. per ton. Surcharges for smaller quantities unless collected at warehouse or depots.

Catalogue Section No. 12 of Hathernware chemical stoneware, published by HATHERNWARE, LTD., of Loughborough, is devoted to chemical stoneware towers, connecting pipe lines, receivers, acid elevators, fans, ejectors, and packings. There are also details concerning de-nitrating towers and bubble-cap columns. The catalogue is copiously illustrated throughout.

The last edition of the WILD BARFIELD Heat-Treatment Journal contains some practical hints on an improved method of determining the case depth of carburised work and details of a "Simple Gas Testing Appliance." There is also an article entitled "Gas Carburising."

Annual Meeting of Benn Brothers, Limited

A Year of Headaches and Nightmares

THE 45th annual meeting of Benn Brothers, Ltd., proprietors of THE CHEMICAL AGE, was held at Bouverie House, Fleet Street, E.C.4, on August 8. The chairman, Sir Ernest J. P. Benn, Bt., C.B.E., moved a resolution approving the annual report and accounts, and recommending that the following dividends be paid, less tax, on August 15: 3 per cent. on the preference shares (making with the interim dividend of 3 per cent. paid on February 15, a total of 6 per cent. for the year ended June 30, 1941), 8 per cent. on the ordinary shares (making with the interim dividend of 4 per cent. paid on February 15, a total of 12 per cent. for the year ended June 30, 1941), and 2s. 4 4/5d. per share on the deferred shares.

Sir Ernest Benn said that he was in the wrong place; he ought to have been sitting in the back row, so that he would have had the opportunity of getting up and offering a few criticisms. He ought to be on the other side of the table because, frankly, he had had very little to do with the report and accounts before the meeting. He was proud of that because it showed that the old ship was really sound and that the captains could be changed from time to time without the ship's coming to any harm. He would offer no detailed observations on the accounts, but there were two or three figures which were too good not to be mentioned. The gross profits were £7000 up, and the second year of totalitarian war had given them the opportunity of putting the Jubilee Pension Fund on a sounder basis with an allocation of an extra £2000, bringing the total to £5000. Another figure that ought not to escape notice was £3800 put to reserve under the War Damage Act, 1941. Despite all this, they had improved their carry-forward.

Sir Ernest went on to say that he would like to pay a tribute to his colleagues on the Board and to everybody in the building for what they had done. What with printers being blitzed, everything being all over the place, and half the staff in the Forces, it was delightful to be able to meet together and pat each other on the back. There was no doubt about it—their record was as good as ever. He could scarcely believe that that sort of thing would continue, but in the hands of his wonderful colleagues there was no knowing what would happen.

Mr. Gordon Robbins's Speech

Mr. Gordon Robbins, deputy chairman, in seconding the motion, turned from figures to the human factor. It had been a year of headaches and nightmares, both directly attributable to the war. The headaches had their origin in the new economy which the State had adopted as an emergency measure; the nightmares were the work of the foreign enemy and, making no distinction of grade or sex, affected one and all. The restrictive activities in the ever-widening area of Government control had borne hardly upon the firm, more particularly in the rationing of paper, the exercise of the censorship, and the calling-up of members of the staff for military service. They had succeeded in keeping abreast of the Paper Controller's edicts, but the process of cutting down the consumption of paper to 25 per cent. of the pre-war volume had not been an easy job, for the Benn journals remained in great demand. Still, by an ingenious combination of expedients, a full contribution to the national need for the saving of shipping space had been made.

The effect of the Government's demands on man-power and woman-power was becoming formidable, though so far its more dangerous possibilities to the firm had been largely negatived by internal re-arrangement and the enlistment of recruits outside the present service age-limits. More than 50 of the male members of the staff as it stood at the outbreak of war had joined the fighting forces, and more than 30 per cent. of them held His Majesty's commission. The house of Benn is proud of the fact that members of it were upholding the national cause in every theatre of war. The Board had been able to maintain the system of allowances to serving members of the staff and their families on the full scale adopted in September, 1939.

Air-Raid Adventures

"The nightmare period," Mr. Robbins continued, "was that of the intensive air-raiding on London. The firm was prepared with its A.R.P. organisation and stout shelter in the basement for the barbarous assault last September. Hard experience caused adaptations and modifications of the scheme of which this, at any rate, can be said, that Bouverie House stands four-square in the heart of Fleet Street, as it stood twelve months ago. There has been no casualty on the premises, and material damage has been confined to 56 windows, which were promptly re-glazed. For the best part of a week, for reasons which need not be specified in detail, we produced the Benn journals from an environment which would have seemed fantastic to any but the adaptable journalist. It was done at a moment's notice, and we could only pick up what lay nearest to our hands. But it is safe to say that none of the readers of our journals noticed the slightest difference in the succeeding issues. There were moments when publication was actually in jeopardy through our printers having their own air raid troubles. Still, we are able to claim that throughout this period none of our sixteen journals missed a single issue, although disaster was narrowly averted when one of the weeklies just scrambled home six days after its proper date of publication."

It was public knowledge, said Mr. Robbins, that there had been considerable devastation in the area of which Bouverie House is the centre, and the second Great Fire of London came so close as to lick the walls. All the many fire bombs on the roof had been put out without damage to the structure by the Bouverie House fire guard, which consisted of every available male member of the staff, several representatives of the tenants, and women volunteers running into double figures, to whom the gratitude of everybody associated with the firm went out in unstinted measure. The air raids had had one notable result in binding the Bouverie House staff more intimately than ever before. Bouverie House had become not merely a workshop by day but a dormitory by night. Through the past year there were never fewer than fifty persons sleeping on the premises, some of the shelterers being members of the staff who had been driven from damaged or destroyed homes. One member of the staff attached to the housekeeper's department was unhappily killed in a public shelter. It could be said with absolute truth that the night Air Battle of London had not merely failed to upset the nerve of the staff, but positively reinforced its fine spirit.

Meanwhile, continued the Deputy-Chairman, costs kept mounting. He could not think of a single article or service used in the production of the Benn journals for which the firm had not had to pay a substantially in-

(*Continued on page* 102)

General News——From Week to Week

Petters, Limited, of Loughborough, have reopened their London office at Bush House, North-West Wing, Aldwych, W.C.2. Tel.: TEMple Bar 6262 (three lines).

The Blaydon A.F.S. were recently called on to put out a fire at the works of Thomas Ness, Ltd., chemical manufacturers, near Blaydon, Durham, when tar and other inflammable material went up in flames.

The Minister of Labour, in reply to a question by Mr. Bellenger in the House of Commons last week, stated that the Beveridge Committee which was to examine the employment of skilled men in the forces, had made an interim report that would be published shortly.

The age of reservation for 16 different classes of iron-workers, mostly moulders, has been increased from 30 to 35 for both stages B (June call-up) and C (December call-up), by an announcement of the Ministry of Labour dated August 9. Post-graduate engineering students engaged in full-time research work have been removed from the schedule.

The grade of the superphosphate available on the British market in the coming season will be of higher quality than that sold in recent years. Improvement in this respect has been gradual; during 1940 most superphosphate was of the 35 per cent. type (containing 16 per cent. phosphoric acid); in the coming season the majority will contain an average of 42 per cent. phosphate (19.2 per cent. phosphoric acid).

The Aluminium Industrie A.G. of Chippis, Switzerland, one of the foremost aluminium producing concerns in Europe, is among the additions in the list of persons and firms in neutral countries, contained in the Trading with the Enemy (Specified Persons) (Amendment) (No. 12) Order, 1941, with whom trading is illegal. Other additions include the Industrias Chimicas Geronazza Brasileira Ltda., Rua Catharina Braida 5, Sao Paulo, Brazil; Productos Thermoplasticos Resinta Ltda., Harmonia 85, Rio de Janeiro; and Alliance Aluminium Cie., Aeschengraben 22, Basle. There are no deletions of chemical interest.

Foreign News

Among the chief increases of imports into British India for the fiscal year ended March 1941 were mineral oil, chemicals (plus 104 lakhs), and dyes (plus 157 lakhs).

The new by-product plant of the Portland Gas and Coke Company, Portland, Oregon, is expected to produce 500,000 gallons of toluol per annum to aid in the manufacture of TNT.

The Matsuo sulphur mine, in Japan, the scene of a disastrous fire in November, 1939, is still idle, though 90 per cent. of the repairs are said to be complete. Operations are due to be resumed before the close of the current year.

Sodium nitrate imports into the United States amounted to 257,438 tons valued at $4,438,817 during the first quarter of 1941 compared with 258,851 tons, valued at $4,867,170 during the same period of 1940.

Exports of chrome ore from Turkey in 1940 amounted to 110,037 metric tons, a big decline from the 1939 figure of 192,842 tons. Germany, which took 104,156 tons in 1939, received none in 1940, but the U.S.A. figure rose from 19,438 to 72,929 tons.

Two new products, sodium fluosilicate and nicotine with arsenic, were recently added to the recognised list of agricultural fungicides and insecticides in Cuba. The United States shipped more than $50,000 worth of agricultural insecticides and similar products to Cuba during 1940.

Some half-dozen chromite deposits of commercial value in Newfoundland are being scientifically examined with a view to exploitation in the near future. The government of the island is likewise expected to institute a survey of the manganese resources.

The Iranian Government is reported to have under consideration the construction of plants for the manufacture of fertilisers and of sodium carbonate. An ammonia plant is to be built near Tehran.

The total production of antimony ore in Argentina during 1940 was approximately 250 tons, including antimony oxides, sulphides, and ores associated with silver, iron, copper and arsenic.

A plant for obtaining vanadium oxide from bauxite, the first of its kind, is said to be operating in Italy. As vanadium does not ordinarily occur in bauxite, the deposit utilised in Italy is thought to be unique.

Plans have been drawn up for the processing of bauxite into alumina and aluminium in Sumatra, Netherlands East Indies. An estimated investment of 25,000,000 to 30,000,000 guilders will be required to complete the project, the plant of which is expected to be in operation in less than two years.

Normal demand for pyrethrum for the manufacture of insecticides in Italy is said to be not less than 1,500 tons annually. Recent experiments made in Liguria and elsewhere proved that pyrethrum for industrial use could be cultivated more extensively than hitherto, thus obviating reliance on foreign sources. Up to the present Italian production has been small—about 300 tons annually.

Acetic acid was imported into India from the United States for the first time during 1940. Acetic acid is produced in India to some extent and toward the close of the year domestic production was augmented by the installation of a plant at the Tata Iron and Steel Works at Jamshedpur. Local manufacturers have so far produced acid of 50 per cent. grade, but a 100 per cent. grade may be placed on the market in the near future.

The National Fertilizer Association of the United States records that more superphosphate was produced in the U.S.A. during the first four months of 1941 than in any similar period in the last 12 years. April production amounted to 330,000 tions compared with 288,000 tons in April, 1940, and with 316,000 in April, 1937, the previous record for April. The fact that stocks are actually 180,000 tons lower than a year ago would seem to indicate a strong demand.

A plant for processing the brucitic limestone from the deposits in the Catineau Valley (Que.), Canada, is to be built by the Aluminium Co. of Canada at Wakefield (Que.), ready for operation early in 1942. This will be the first plant in Canada in which raw materials for the production of magnesium metals will be dealt with. It is understood that the pure magnesium oxide produced will be used in the first instance for the manufacture of refractories.

Non-ferrous metals are in such short supply in unoccupied France, according to a Vichy report, that stocks in hand will last only a few weeks, and an appeal is to be made to householders to hand over to the State all articles made of brass, copper, nickel, lead, bronze, or zinc that can possibly be spared. A recent B.B.C. broadcast in French gave warning of this, and suggested to householders that all such articles should be hidden, as they would otherwise be used to feed the German arsenals. A graphic account was included of the number of cartridge cases that could be made from a copper saucepan.

Domestic production in the United States of manganese ore containing 35 per cent. or more manganese (natural) during April was, according to the Bureau of Mines, 2300 long tons, shipments were 2600 tons, and producers' stocks at the end of the month were 1800 tons. In March, production was 1800 tons, shipments were 2000 tons, and producers' stocks were 2100 tons. The rate of shipments averaged 3344 tons monthly in 1940, when the total amounted to 40,123 tons. April imports for consumption of battery-grade ore were 846 long tons, containing 485 tons of manganese, all from the Gold Coast.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

MANGANESE BRONZE & BRASS CO., LTD., London, S.W. (M., 16/8/41.) July 25, Land Registry charge to Midland Bank Ltd. securing all moneys due or to become due to the Bank; charged on St. Davids Wharf, West Ferry Road, Millwall; also July 25 mortgage and charge, to Midland Bank Ltd. securing all moneys due or to become due to the Bank; charged on Handford Works, Ipswich, with power trade machinery, etc., also general charge. *Nil. April 24, 1941.

A. T. MORSE SONS & CO., LTD., London, E., paint manufacturers. (M., 16/8/41.) July 19, series of £10,000 debentures present issue £5000; general charge. *Nil. April 17, 1941.

County Court Judgment

EAST LONDON MANUFACTURING CO., LTD., R/O, 101/9 Boleyn Road, East Ham, creosote manufacturers (C.C.J., 16/8/41.) £16 17s. 4d. May 27.

Company News

Wm. Neill and Sons (St. Helens), Ltd., chemical and industrial engineers, have declared a second interim dividend of 1¾d. per 2s. ordinary share, making 3d. per share to date.

Impervia, Ltd., have increased their nominal capital beyond the registered capital of £4000 by the addition of £1000 in £1 ordinary shares.

Portland Plastics Ltd., have increased their nominal capital beyond the registered capital of £100 by the addition of £9900 in £1 ordinary shares.

Halex, Ltd. (manufacturers of plastic materials), have increased their nominal capital to £300,000 by the addition of £75,000 in £1 ordinary shares.

Reckitt and Sons, Ltd., have declared the usual quarterly dividend of 5 per cent. on ordinary stock. Last year there were three quarterly interims of 5 per cent., a final of 6¼ per cent., and a bonus of 1¼ per cent.

Sangers, Ltd., whose recent dividend announcement was published in our last issue, record a trading profit of £209,754 for the 13 months to April 30, compared with £249,796 for the year ended March 31, 1940. Out of this taxation absorbs £98,011 (£90,133); carry forward is £115,803 (£175,455).

New Companies Registered

Romford Chemical Co., Ltd. (368,391).—Private company. Capital, £200 in 200 shares of £1 each. Manufacturers of and dealers in chemicals, disinfectants, spraying fluids, fertilisers, oils, colours, etc. Directors: Sybil M. Chopping, Dominic J. Stone. Registered office: 1 London Road, Romford.

Venta Trading Company, Ltd. (368,268).—Private company. Capital: £1000 in 1000 shares of £1 each. Manufacturers, importers, exporters, merchants and factors of disinfectants, deodorants, soaps, detergents, cleansing substances, etc. Subscribers: J. F. L. Crouch; C. W. Wade, 89 Spring Grove, Hounslow.

Plasticrete Holdings, Ltd. (368,466).—Private company. Capital, £100 in 100 shares of £1 each. To acquire all or any of the stock, shares and securities of Plasticrete Products, Ltd., or any other company of a similar business, etc. Subscribers: Cyril G. Wade, James R. Rotheroe. Solicitor: H. A. L. Richardson, 25 Warwick Row, Coventry.

Plasticrete Products, Ltd. (368,442).—Private company. Capital, £2000 in 2000 shares of £1 each. Manufacturers of and dealers in plastic, modelling and moulding materials, substances and compositions, manufacturers of and dealers in rubber, gutta percha and vulcanite and goods manufactured therefrom, gums, glues, cements, pastes, adhesives, chemicals, etc. Subscribers: Cyril G. Wade, James R. Rotheroe. Solicitor: H. A. L. Richardson, 23 Warwick Row, Coventry.

Chemical and Allied Stocks and Shares

EARLIER in the week subdued conditions developed in Stock Exchange markets on fears of the war extending to the Far East, but although the volume of business declined, no strong selling pressure developed. Indeed, there appeared to be an underlying current of cheerfulness in markets owing to the firmness with which all classes of securities continued to be held, and declines on balance for the week were moderate in character. Although the nature of the war news may from time to time result in fluctuations in market sentiment, the prevailing view is that, over a period, British funds are likely to record a further advance, and the disposition is to expect that the trend in gilt-edged will govern most other sections of the market. Indeed although less active this week, leading industrial securities have again experienced a fair amount of demand, buyers being attracted by the favourable yields obtainable on shares which in some directions seem to have reasonable possibilities of satisfactory dividend payments during the period of the war.

The market is continuing to assume that the forthcoming Imperial Chemical interim is likely to be kept at 3 per cent., and that the total payment for the year may be again 8 per cent. The ordinary units were up to 32s. 6d. a few days ago, but at the time of writing have moved mack to 32s. 1½d. which, however, compares with 31s. 10½d. a week ago; the 7 per cent. preference units were 32s. 9d. Business up to 61s. was recorded in B. Laporte. Elsewhere, Fison Packard had a firmer appearance at 33s. 9d., and among other shares of manufacturers of fertilisers, Cooper McDougall were firmly held and were around 21s. 3d., partly on the view that after the war these and similar companies will experience large expansion in demand for their products owing to the revival that can then be expected in export markets. British Oxygen at 67s. 6d. were well maintained on balance, awaiting the interim dividend announcement, and British Aluminium were slightly higher at 46s. 6d. Lever & Unilever, however, eased slightly, although in other directions, British Oil & Cake Mills preferred had a firmer appearance at 39s. 3d. and Borax Consolidated were again maintained at 28s. 6d. Moreover, Imperial Smelting held the improved tendency which developed recently, and were 11s. 9d.; and at 9s. 10½d. General Refractories more than held their improvement of a week ago. At the time of writing, Associated Cement have remained steady at 56s. 3d. British Plaster Board were again active; these 5s. shares moved higher to 17s. Among smaller-priced securities, British Industrial Plastics were close on 3s. and Erinoid transferred at slightly over 4s., while Low Temperature Carbonisation 2s. ordinary were quoted at around 1s. 3d.

On further consideration of the financial results, Metal Box shares improved from 75s. 7½d. to 76s. 3d., but elsewhere Turner & Newall went back a few pence. Nairn & Greenwich improved further from 57s. 6d. to 58s. 9d., and at the time of writing Barry & Staines are 32s. 3d. compared with 31s. 6d. a week ago. There was again a fair amount of activity among iron and steel securities, which attracted attention in view of the satisfactory yields offered on the basis of last year's dividends. Dorman Long were 23s.; Stewarts & Lloyds 47s. 3d.; United Steel 23s. 10½d.; and Tube Investments 95s. Monsanto Chemicals 5½ per cent. preference were again 22s. 6d., and business up to 23s. 6d. was recorded in Morgan Crucible 5½ per cent. preference, while British Glues participating preference transferred at 28s. Goodlass Wall 7 per cent. preference have shown business at 27s. 9d., and the 10s ordinary shares of this company were dealt in at a few pence below their par value. Greeff-Chemicals Holdings 5s. shares transferred at 4s. 7½d. at one time. Pinchin Johnson, in other directions, were higher on balance at 22s. awaiting declaration of the interim dividend, and Wall Paper Manufacturers deferred units were higher at 25s. 1½d.; results of the last named company are due shortly.

Boots Drug 5s. ordinary were firm at 36s., as were Beechams Pills 2s. 6d. deferred at the higher price of 9s. 1½d. Sangers failed to keep best prices touched in the past few days, but were 15s. 9d. aided by the results, which were regarded in the market as a good achievement, bearing in mind the conditions ruling. British Drug Houses were firm at 22s. 6d. and the 5 per cent preference shares were unchanged at 21s. 3d. In accordance with the general tendency on the Stock Exchange, "Shell" and other oil shares were slightly below the prices ruling earlier in the week.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Applications for Patents

Coating compositions.—American Cyanamid Co. (United States, Sept. 20, '40.) 8118.

Coating compositions.—American Cyanamid Co. (United States, Oct. 31, '40.) (Cognate with 8118.) 8119.

Production of stable amino plastic syrups.—American Cyanamid Co. (United States, Aug. 8, '40.) 8285.

Plastics.—American Cyanamid Co. (United States, Aug. 22, '40.) 8344.

Acid treatment of coking coals.—American Cyanamid Co. (United States, July 2, '40.) 8359.

Briquette carbonising processes.—American Cyanamid Co. (United States, July 2, '40.) 8360.

Vacuum treatment of coking coals.—American Cyanamid Co. (United States, July 2, '40.) 8361.

Production of branched-chain alkanes.—Anglo-Iranian Oil Co., Ltd., E. W. M. Fawcett and G. I. Jenkins. 8306, 8307, 8308.

Moulding of articles.—Bakelite, Ltd., A. Lloyd, N. W. Knewstubb and C. D. Philippe. 8143.

Adhesive bonding of surfaces.—B. B. Chemical Co., Ltd., L. E. Puddefoot, W. H. Swire, K. H. Elson and A. D. Woods. 8183.

Hydrogenation.—Colgate-Palmolive-Peet Co. (United States, July 5, '40.) 8268.

Manufacture of vinyl chloride.—Distillers Co., Ltd., and H. M. Stanley. 8296.

Production of vinyl chloride.—Distillers Co., Ltd., H. M. Stanley and J. E. Yonell. 8295.

Treatment of smokeless powder.—E. I. du Pont de Nemours and Co. (United States, June 28, '40.) 8189.

Manufacture of polymeric materials.—E. I. du Pont de Nemours and Co. (United States, June 28, '40.) 8190.

Polymeric materials.—E. I. du Pont de Nemours and Co. (United States, July 2, '40.) 8323, 8324.

Coating compositions.—E. I. du Pont de Nemours and Co., D. M. Gowing and P. F. Sanders. 8091.

Method and means for preventing corrosion, etc., of metal conduits.—Essex Aero, Ltd., and R. J. Cross. 8193.

Production of manganese alloys.—E. Feuer and B.K.L. Alloys, Ltd. 8144.

Method and apparatus for the quantitative analysis of a mixture of gases.—Gas Light and Coke Co. and W. J. Gooderham. 8128.

Composite articles.—W. E. F. Gates and Imperial Chemical Industries, Ltd. 8089.

Wood rosin.—Hercules Powder Co. (United States, Sept. 16, '40.) 8291.

Smokeless powder.—Hercules Powder Co. (United States, Jan. 9.) 8356.

Method and apparatus for spray-drying liquids.—Inredeco, Inc. (United States, April 24.) 8331.

Coating of metal parts.—Interchemical Corporation. (United States, July 2, '40.) 8370.

Catalysts for reforming.—International Catalytic Oil Processes Corporation. (United States, July 29, '40.) 8216.

Manufacture of superphosphatic fertilisers.—L. Mellersh-Jackson (Facerform Corporation). 8354.

Apparatus for separating liquids.—H. T. G. Mackay and C. W. Hansel. 8283.

Treatment of aluminium and aluminium base alloys.—Magnesium Metal Corporation, Ltd., and W. K. J. Pearson. 8213.

Manufacture of sulphonamido compounds.—Manchester Oxide Co., Ltd., B. Bann and P. Krug. 8276.

Production of organic halogen compounds.—J. R. Myles, F. S. B. Jones, and Imperial Chemical Industries, Ltd. 8090.

Hardened lead alloys.—National Lead Co. (United States, July 24, '40.) 8278.

Manufacture of diketene.—R. G. A. New and Imperial Chemical Industries, Ltd. 8325.

Chemical manufacture.—C. N. Richardson. 8362.

Alkylation of olefinic mixtures.—Standard Oil Development Co. (United States, July 16, '40.) 8191.

Treating materials with alkaline reagents.—Tootal Broadhurst Lee Co., Ltd., A. J. Hall and F. C. Wood. Oct. 30, '39.) 8245. (Nov. 13, '39.) 8246. (Dec. 11, '39.) 8247. (Dec. 14, '39.) 8248. (March 15, '40.) 8249. (July 5, '40.) 8250.

Separation of fine particles from gases.—Traughber Filter Co., Ltd., and W. F. Mode. 8286.

Manufacture of saturated fibrous material.—Vellumoid Co. (United States, July 6, 40.) 8355.

Manufacture of copying paper.—R. Wälti. (Switzerland, July 1, '40.) 8033.

Refractory nozzles for supplying combustible gas to furnaces, etc.—Woodall-Duckham (1920), Ltd., C.U.R.A. Patents, Ltd., E. W. Smith, and J. G. Bennett. 8184.

Complete Specifications Open to Public Inspection

Hydrolysis of fats.—Colgate-Palmolive-Peet Co. Dec. 29, 1939. 17557/40.

Preparation of sulphonic derivatives of organic materials.—Colgate-Palmolive-Peet Co. Dec. 20, 1939. 17823/40.

Manufacture of organic compounds.—British Celanese, Ltd. Dec. 27, 1939. 17886/40.

Process for the preparation of decorated foils and sheets of plastic material.—Soc. des Usines Chimiques Rhône-Poulenc. Dec. 27, 1939. 18043/40.

Purification of aqueous hydrogen peroxide.—Mathieson Alkali Works. Dec. 29, 1939. 18182/40.

Dihydroxy acetone diethers.—J. R. Geigy A.-G. Dec. 29, 1939. 18183/40.

Mordant dyestuffs.—Durand and Huguenin A.-G. Dec. 28, 1939. 18199/40.

Complete Specifications Accepted

Filtration of liquids.—C. J. Gray and Separators, Ltd. Dec. 21, 1939. 537,498.

Replenishing and correcting the electrolyte in the refining of aluminium by igneous electrolysis.—Compagnie de Produits Chimiques et Electrometallurgiques Alais, Froges, et Camargue. July 12, 1938. 537,501.

Acid conversion of starch and the recovery of crystalline dextrose.—A. E. Berry. Oct. 4, 1939. (Cognate application, 656/40.) 537,461.

Alloy for welding-rod having high tensile strength and insensibility to thermal action.—A. Nepoti. Sept. 1, 938. 537,607.

High explosives.—Imperial Chemical Industries, Ltd. Oct. 10, 1938. 537,579.

Process for the separation of olefines from mixtures of hydrocarbons.—Standard Oil Development Co. Dec. 29, 1938. 537,468.

Composite materials made from vinyl resins.—Carbide and Carbon Chemicals Corporation. Dec. 6, 1938. (Addition to 518,555.) 537,583.

Anodic treatment of aluminium and its alloys.—E. Windsor-Bowen, and C. H. R. Gower. Nov. 27, 1939. 537,474.

Composition and process for lining metal and other containers.—Crown Cork and Seal Co., Inc. Dec. 17, 1938. 537,610.

Heat-treatment of aluminium base alloys.—British Thomson-Houston Co., Ltd. Dec. 23, 1938. 537,512.

Dehydrogenation.—H. Dreyfus and W. H. Groombridge. Dec. 20, 1939. 537,479.

Apparatus for the production of coke, gas, and by-products in vertical retorts.—Gas Chambers and Coke Ovens, Ltd., and A. H. Lymn. Dec. 20, 1939. 537,585.

Alloys.—L. Mellersh-Jackson (Baker and Co., Inc.). Dec. 20, 1939. 537,545.

Production of ketene, acetic anhydride, acetic acid, and homologues thereof.—H. Dreyfus. Dec. 21, 1939. (Addition to 490,544.) 537,480.

Electrical method and apparatus for analysing gaseous mixtures.—J. G. Fife (N. V. de Bataafsche Petroleum Mij.). Dec. 22, 1939. 537,486.

Nitration of structures of regenerated cellulose and the production of patterned etching effects using yarns thereof.—Heberlein and Co. A.-G. Jan. 5, 1939. 537,519.

Method of producing moulded concrete or like products, and apparatus therefor.—W. E. S. Strong. Dec. 29, 1939. 537,548.

Preparing substituted phthalic anhydrides.—Compagnie de Produits Chimiques et Electrometallurgiques Alais-Froges, et Camargue. Jan. 26, 1939. 537,523.

Manufacture of catalyst for the treatment of hydrocarbons, and the conversion of open-chain hydrocarbons into closed-chain hydrocarbons by means of such catalyst.—Standard Oil Development Co. April 8, 1939. 537,532.

Manufacture of hydrocarbon gases and other products of destructive distillations.—T. D. Kelly. Feb. 26, 1940. (Addition to 517,668.) 537,533.

Manufacture of chlorine dioxide.—H. G. C. Fairweather. (Mathieson Alkali Works). Feb. 29, 1940. 537,557.

(Continued from page 98.)

creased charge; and as the meaning of competitive prices seemed to have been entirely forgotten, there was no alternative for the firm but to make the best of a bad job. They had made such economies as were possible, and had undertaken certain adjustments of the advertisement and subscription rates, although in many cases upward movement had been ruled out by the fact that the industries served were entangled in the same vicious circle. Attention was drawn in the report to two developments of the firm's publishing in a field it had made specially its own, the presentation to foreign buyers of British shop windows in the language of the customer. The Textile Supplement of *Industria Britanica* and the Turkish Supplement of *The British Trade Journal* were a powerful contribution to the provision of the sinews of war.

The "G.H.Q." of Fleet Street

A specially warm welcome was given to the Newspaper Proprietors' Association when they transferred their headquarters to Bouverie House a month or two ago. As, in addition, the governing bodies of the Newspaper Press Fund and the Institute of Journalists had been holding their meetings here by invitation of the Board, we were well on the way to realising our ambition to make our fine building the G.H.Q. of Fleet Street.

Since the accounts were made up, Mr. Robbins concluded, the Board had had to lament the death of one of its most loved members, Mr. C. E. Hughes, who was second in seniority to the chairman on the Board, and, indeed, on the staff. Two younger members of the Board who were playing their part in the Fighting Services, Mr. Glanvill Benn and Mr. John Benn, had each received his third "pip."

Mr. Norman French moved, and Mr. W. Vestey seconded, a resolution for the re-election of Sir Ernest Benn and Mr. K. E. Hughes as directors of the Company. On the motion of Mr. K. E. Hughes, seconded by Mr. R. L. Webb, Messrs. Cassleton Elliott & Co. were re-elected auditors. All the resolutions were carried unanimously.

Training for Engineering

Higher Grade Courses

ARRANGEMENTS for providing Higher Grade Courses at Government Training Centres, Technical Colleges and in industrial establishments where the equipment and instructors are available are now to be developed to the fullest possible extent. The training up of experienced workpeople to a higher degree of skill than that which they possess, *e.g.*, the training of employers' operatives as setters (autos, capstans, millers, etc.), toolroom workers, and other skilled grades engaged on production work is regarded as one of the most valuable forms of training which the Government can undertake to assist employers. The instruction is given by competent craftsmen with up-to-date experience of industry and with the ability and experience to impart their knowledge. The course will normally last a few weeks.

Under this scheme the employer can get his skilled operatives trained to a higher degree free of charge. The operatives remain on the employer's pay-roll during training and return to their employers afterwards. In appropriate cases the Ministry is prepared to provide some financial assistance to meet the expenses which the employer may incur owing to the man's absence, and to arrange for trainees from Government Training Centres to take the place of men undergoing training. In certain circumstances allowances for travelling and lodging will be payable to the trainee.

Employers in need of skilled workers for setting or for toolroom work and unable to train their own operatives are urged to get in touch with the Divisional Controller of the Ministry in their area or their nearest employment exchange. A leaflet (P.L. 92/1941) describing the facilities available under the scheme is being distributed to employers in the engineering industry and any interested employer who does not receive a copy should apply to the nearest Local Office of the Ministry of Labour and National Service.

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